

REMARKS

Claim 13 and 18-25 are currently pending in this application. By this amendment, claim 13 is amended. Support for the amendments is found, for example, at page 9, lines 2-5 and FIG. 15 of the application as originally filed. No new matter has been introduced. Favorable reconsideration of the application in light of the foregoing amendments and following comments is respectfully solicited.

In section 5 of the Office Action, claims 13, 19, 22, and 23 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,933,219 (Unno) in view of U.S. Patent App. Pub. No. 2004/0080732 (Kuroda). In section 10 of the Office Action, claims 18 and 20 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Unno in view of Kuroda and U.S. Patent No. 6,685,848 (Sasaki). In section 14 of the Office Action, claim 21 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Unno in view of Kuroda and U.S. Patent App. Pub. No. 2002/0168593 (Lin). In section 18 of the Office Action, claims 24 and 25 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Unno in view of Kuroda and U.S. Patent App. Pub. No. 2002/0155395 (Nakao). Applicant respectfully traverses.

Unno

Unno, col. 4, lines 42-45, discloses that “the resolution of patterns 20, 22, 23 and 26 (which extend in the x direction) is improved when the images thereof are formed on the wafer by using a light ray linearly polarized in the x direction.” In Unno, a light ray linearly polarized in the y direction is used when pattern 21 which extends in the y direction is formed on the wafer (*see* col. 4, lines 50-54). As described above, Unno merely teaches a general concept that it is preferable to orient a direction of polarized light to a longitudinal of a pattern from the viewpoints of improving a resolution. However, as acknowledged by page 3, lines 13-15 of the Office Action, “[Unno] does not explicitly teach that the pattern formed by the reticle patterns

... form a pattern substantially the same width in the first and second directions.” Accordingly,

Unno does not disclose or render obvious, as recited in claim 13,

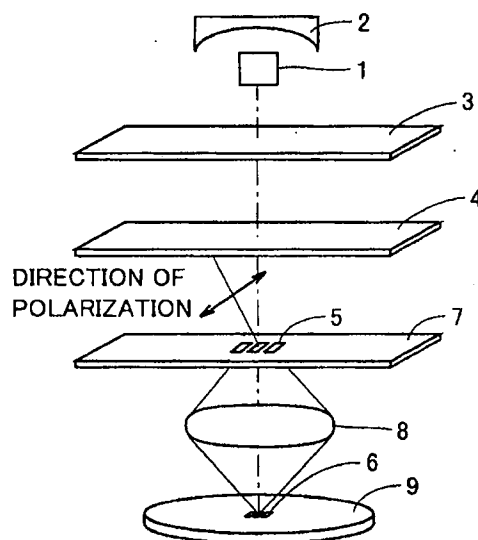
employing linearly polarized light to transfer on a resist film formed on a wafer a mask pattern formed on a mask, the transfer performed by a projection exposure method in which a projection optical system is disposed between said mask and said resist film;

...
wherein to form said pattern said mask pattern has an opening larger in width in a first direction parallel to said linearly polarized light's direction of polarization than a second direction orthogonal to said first direction, and

said pattern is substantially the same width in said first and said second directions.

Kuroda

Seeking to cure the acknowledged shortcomings of Unno, sections 7-8 of the Office Action propose combining Unno and Kuroda. However, Kuroda is wholly unsuitable for combination with the teachings of Unno or being otherwise modified to yield the claimed subject matter, at least because the physical effect relied upon by the Kuroda exposure technique will not work where “a projection optical system is disposed between said mask and said resist film,” as recited in amended claim 13. FIG. 15 of this application, shown below, illustrates a nonlimiting embodiment of amended claim 13, in which objective lens 8 is disposed between photomask 7 and resist film on wafer 9.



Kuroda employs “a near-field exposure” physical effect in which photomask 701 and resist 707 must be almost in contact with each other (*see* Kuroda, FIG. 7), and optical energy

passing through the photomask is transmitted over a very small distance. As explained in Kuroda, paragraphs [0060]-[0061], with respect to FIG. 8:

... The near-field light 806 is a non-propagating light that is generated only in the vicinity of the opening within a distance of not larger than about 100 nm from the opening, and has a property that the intensity of the near-field light is abruptly reduced as the distance from the opening increases.

Then, the surface of a resist 808 substrate 807 is positioned ... within a distance of not larger than about 100 nm from the pattern 805. ...

(emphasis added)

Kuroda, paragraph [0072] further explains “photomask 701 is ... pressed against the composite of the resist 707 and the substrate 706 so that they can be positioned close to each other over the entire surfaces.” Given the close positioning required between the photomask and resist in order to realize the near-field exposure effect relied upon by Kuroda, Kuroda’s technique is not compatible with “a projection optical system ... disposed between said mask and said resist film,” as recited in independent claim 13. Thus, Kuroda cannot be modified, or serve as a basis for modifying Unno, to yield the claimed subject matter “employing linearly polarized light to transfer on a resist film formed on a wafer a mask pattern formed on a mask by a projection exposure method in which a projection optical system is disposed between said mask and said resist film,” as recited in claim 13. Accordingly, Kuroda is unable to cure the shortcomings of Unno acknowledged by the Office Action.

Additionally, in Kuroda, due to forming first slit openings 103 which are located at the periphery of the area where latent images 107 are formed (*see* Kuroda, FIG. 1), a risk for forming a pattern at unintended locations is increased, which is not presented by the claimed subject matter.

For at least the above reasons, Unno and Kuroda do not render obvious independent claim 13. Sasaki, Lin, and Nakao, either individually or in combination, do not bridge the gaps

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between claim 13 and Unno and Kuroda. Thus, claim 13 is not obvious in view of the cited art. Accordingly, Applicant respectfully requests withdrawal of the rejection of independent claim 13, and claims 18-25 which depend thereon.

In view of the above remarks, Applicant respectfully submits that the application is in condition for allowance, and respectfully requests the Examiner's favorable reconsideration as to allowance. The Examiner is invited to contact the Applicant's representative listed below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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